

### EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with George R. Rapacki (Reg. No. 60770) on 19 October 2010.

The application has been amended as follows:

**[Claim 1]** (Currently Amended) A method for increasing the fault tolerance in a network, said method comprising acts of:

associating a plurality of nodes with a sub-network, each of said plurality of nodes capable of sending and receiving data;

adding a plurality of cross layer communication agent capable nodes, herein referred to as CCA-capable nodes, to said sub-network, said plurality of CCA-capable nodes capable of receiving data from and sending data to said plurality of nodes; and

determining which one of the plurality of CCA-capable nodes to assign as a gateway CCA, whereby said gateway CCA is used by each one of said plurality of nodes within said sub-network to communicate with the rest of the network; wherein

the act of determining the assignment of the gateway CCA further comprises acts of:

designating one of the plurality of CCA-capable nodes to be a gateway CCA;  
broadcasting a message from each CCA-capable node to the plurality of nodes every T1 seconds;

wherein T1 is a predetermined time period; and

selecting a new gateway CCA based upon the message from each CCA-capable node; and wherein the act of selecting further comprises acts of:

determining a current time at which the message from each CCA-capable node was received;

retrieving a gateway time TLAST at which a message from a gateway CCA was received;

wherein TLAST is determined as a time when the message from the gateway CCA was received last;

designating each CCA-capable node as a Responding CCA-capable node when

$TLAST < (\text{current time} - 2(T1))$  is true for the CCA-capable node; and

selecting and assigning a the new gateway CCA from the ~~Responding~~ CCA-capable nodes such that  ~~$TLAST < (\text{current time} - 2(T1))$  is true~~, herein referred to as ~~Responding CCA-capable nodes~~.

**[Claim 2]** (Previously Presented) The method of Claim 1, wherein the act of determining the assignment of the gateway CCA further comprises sub-acts of:

querying the gateway CCA from each node to determine whether the gateway CCA is active and awaiting a response, and when:

the gateway CCA responds, repeating the querying act; otherwise,  
broadcasting a solicit message for receipt by CCA-capable nodes and awaiting a response, and when:

a CCA-capable node responds, assigning a CCA-capable node as the gateway CCA; otherwise,  
repeating the broadcasting act.

**[Claim 3]** (Original) The method of Claim 2, wherein when a plurality of CCA-capable nodes respond, selecting from the plurality of CCA-capable nodes responding, a single CCA-capable node for use by all of the nodes as the gateway CCA.

**[Claim 4]** (Cancelled)

**[Claim 5]** (Currently Amended) The method of Claim 1, wherein said act of determining the assignment of the gateway CCA further comprises acts of:

querying the plurality of CCA-capable nodes, from each node, to determine  
whether the plurality of CCA-capable nodes are active and awaiting a  
response, and when:

the gateway CCA responds, repeating the querying act; otherwise,

changing the CCA-capable node assigned to be the gateway CCA based upon a response from the plurality of CCA-capable nodes.

**[Claim 6]** (Original) The method of Claim 5, wherein when a plurality of CCA-capable nodes respond, selecting from the plurality of CCA-capable nodes responding, a single CCA-capable node for use by all of the nodes as the gateway CCA.

**[Claim 7]** (Cancelled)

**[Claim 8]** (Currently Amended) The method of Claim 1, wherein said act of determining the assignment of the gateway CCA further comprises acts of:

compiling a list of Responding CCA-capable nodes on at least one CCA-capable node;

querying each CCA-capable node, from at least one CCA-capable node, in the list to determine the state of each CCA-capable node;

updating the list of Responding CCA-capable nodes based on a response from each of the CCA-capable nodes; and

checking for a response from the gateway CCA, and when: the gateway CCA responds, repeating the querying act; otherwise, transmitting the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network; and

selecting and assigning a new gateway CCA from the list of Responding CCA capable nodes.

**[Claim 9]** (Cancelled)

**[Claim 10]** (Currently Amended) The method of Claim 1, wherein the act of determining the assignment of the gateway CCA further comprises acts of:

querying each CCA-capable node, from at least one CCA-capable node, in the plurality of Responding CCA-capable nodes to determine its state;

updating a list of Responding CCA-capable nodes, stored on the at least one CCA capable node, based on a response from each of the CCA-capable nodes;

sending, from the at least one CCA-capable node, the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network;

waiting to repeat the querying act; and

checking, by at least one node in the plurality of nodes, the list of Responding CCA capable nodes for the gateway CCA, and

when: the gateway CCA is in the list of CCA-capable nodes, said

at least one node waiting for the next list of Responding CCA-capable nodes;

otherwise,

selecting and assigning a new gateway CCA from the list of Responding CCA-capable nodes.

**[Claim 11]** (Cancelled)

**[Claim 12]** (Cancelled)

**[Claim 13]** (Cancelled)

**[Claim 14]** (Cancelled)

**[Claim 15]** (Currently Amended) The method of Claim 1, wherein said act of determining the assignment of the gateway CCA further comprises acts of:

transmitting a vote from each Responding CCA-capable node to all other CCA-capable nodes identifying which CCA-capable node has been designated a subsequent gateway CCA; and tallying said votes for each CCA-capable node, and

when: one CCA-capable node receives more votes than any of the other CCA-capable nodes,

assigning the one CCA-capable node to become the new gateway CCA, otherwise repeating the transmitting act.

**[Claim 16]** (Original) The method of Claim 15 further comprising an act of determining if at least 2/3 of the plurality of CCA-capable nodes are active, and wherein at least 2/3 of the CCA-capable nodes must respond before performing the act of transmitting the vote.

**[Claim 17]** (Original) The method of Claim 1, wherein the act of associating the plurality of nodes further comprises an act of associating the plurality of nodes in an ad-

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hoc manner.

**[Claim 18]** (Original) The method of Claim 1, further comprising an act of providing at least a portion of the plurality of nodes and CCA-capable nodes that are able to be mobile.

**[Claim 19]** (Currently Amended) A network comprising:

a plurality of nodes, each of said plurality of nodes capable of sending and receiving data, the plurality of nodes forming a first sub-network;

a plurality of cross layer communication agent capable nodes, herein referred to as CCA-capable nodes, at least one of said plurality of CCA-capable nodes capable of communicating with the plurality of nodes and capable of communicating with a second sub-network, wherein

the plurality of nodes and the plurality of CCA-capable nodes communicate to determine which CCA-capable node to assign as a gateway CCA, whereby

the gateway CCA is used by each one of the plurality of nodes and the remaining CCA-capable nodes to communicate with the second sub-network;

a designation instruction block in each of the CCA-capable nodes for designating one of the plurality of CCA-capable nodes to be a gateway CCA;

a broadcast message sent from each CCA-capable node every T1 seconds to the plurality of nodes; wherein

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T1 is a predetermined time period; and

a selecting instruction block in each of the CCA-capable nodes for selecting a

new gateway CCA based upon a received active the broadcast message

from each CCA-capable node; and wherein

the selecting instruction block comprises:

a current time determination instruction block for determining a current time at

which the broadcast message from each CCA-capable node was

received;

a retrieving instruction block for retrieving a gateway time TLAST at which a

message from the gateway CCA was received; wherein

TLAST is determined as a time when the message from the gateway CCA was

received last;

a response-designating instruction block for designating each CCA-capable node

as a Responding CCA-capable node when  $TLAST < (\text{current time} - 2(T1))$

is true for the CCA-capable node; and

a selecting and assigning instruction block for selecting and assigning a the new

gateway CCA from the ~~Responding CCA-capable nodes such that TLAST~~

~~(current time - 2(T1)) is true, herein referred to as Responding CCA-~~

~~capable nodes.~~

**[Claim 20]** (Previously Presented) The network of Claim 19 further comprising:



a designation message for designating one of the plurality of Responding CCA-capable nodes as the gateway CCA;  
a querying message sent from each node to the gateway CCA to determine whether the gateway CCA is active;  
a timeout period where each node waits for a response from the gateway CCA, and  
when: the gateway CCA responds, a second querying message is sent;  
otherwise, a solicit message is sent to the plurality of Responding CCA-capable nodes, and  
when: a CCA-capable node responds, an assignment instruction block assigns the CCA-capable node as the gateway CCA; otherwise, a second solicit message is sent.

**[Claim 21]** (Original) The network of Claim 20, wherein when a plurality of CCA-capable nodes respond to the solicit message, the assignment instruction block selects a single CCA capable node from the plurality of CCA-capable nodes responding to the solicit message, for use by all of the nodes as the gateway CCA.

**[Claim 22]** (Cancelled)

**[Claim 23]** (Currently Amended) The network of Claim 19 further comprising:

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a designation message for designating one of the plurality of Responding CCA-capable nodes to be a gateway CCA;

a query message sent from each node for querying the plurality of Responding CCA-capable nodes to determine whether they are active;

a timeout period where each node waits for a response from each of the plurality of Responding CCA-capable nodes;

a gateway CCA response message, whereby

when a the gateway CCA response message is received, a second query message is sent and

if no gateway CCA response message is received, an assignment instruction block changes the CCA-capable node assigned to be the gateway CCA based upon a response from the plurality of Responding CCA-capable nodes.

**[Claim 24]** (Previously Presented) The network of Claim 23, when a plurality of CCA-capable nodes respond to the query message, the assignment instruction block selects a single CCA-capable node from the plurality of Responding CCA-capable nodes responding to the solicit message, for use by all of the nodes as the gateway CCA.

**[Claim 25]** (Cancelled)

**[Claim 26]** (Previously Presented) The network of Claim 19 further comprising:

- a designation message for designating one of the plurality of Responding CCA-capable nodes to be a gateway CCA;
- a compiling instruction block for compiling a list of CCA-capable nodes on at least one CCA-capable node of the plurality of Responding CCA-capable nodes;
- a query message sent from the at least one CCA-capable node for querying each CCA-capable node in the list to determine its state, whereby the compiling instruction block updates the list of Responding CCA-capable nodes based on a response from each of the CCA-capable nodes; and
- checks for a response from the gateway CCA, and
- when the gateway CCA responds, a second query message is sent; otherwise, a transmitting instruction block transmits the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network; and
- a selecting and assigning instruction block in each node selects and assigns a new gateway CCA from the list of Responding CCA-capable nodes.

**[Claim 27]** (Cancelled)

**[Claim 28]** (Previously Presented) The network of Claim 19 further comprising:

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a designation instruction block, on at least one CCA-capable node of the plurality of Responding CCA-capable nodes, for designating one of the plurality of Responding CCA capable nodes to be a gateway CCA;

a query message sent from at least one CCA-capable node of the plurality of CCA-capable nodes for querying each CCA-capable node in the plurality of Responding CCA-capable nodes to determine its state;

a compiling instruction block, on the at least one CCA-capable node, for compiling a list of CCA-capable nodes based on a response from each of the Responding CCA-capable nodes;

a sending instruction block, on the at least one CCA-capable node, for sending the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network; and

a checking instruction block, on the plurality of nodes, for checking the list of Responding CCA-capable nodes for the gateway CCA, whereby when the gateway CCA is in the list of Responding CCA-capable nodes the node waits for the next list of Responding CCA-capable nodes; otherwise, a selecting and assigning instruction block in each node selects and assigns a new gateway CCA from the list of Responding CCA-capable nodes.

**[Claim 29]** (Cancelled)

**[Claim 30]** (Cancelled)

**[Claim 31]** (Cancelled)

**[Claim 32]** (Cancelled)

**[Claim 33]** (Previously Presented) The network of Claim 19 further comprising:  
a designation instruction block in each of the CCA-capable nodes for designating  
one of the plurality of Responding CCA-capable nodes to be a gateway  
CCA;  
a transmitting instruction block for transmitting a vote from each CCA-capable  
node to all other CCA-capable nodes identifying which Responding CCA-  
capable node has been designated a subsequent gateway CCA; and  
a tallying instruction block in each of the CCA-capable nodes for tallying said  
votes for each Responding CCA-capable node, whereby  
when one Responding CCA-capable node receives more votes than any of the  
other CCA-capable nodes, an assigning instruction block assigns the one  
Responding CCA-capable node to become the new gateway CCA,  
otherwise the transmitting instruction block transmits a second vote.

**[Claim 34]** (Original) The network of Claim 33 further comprising a determination  
instruction block for determining if at least 2/3 of the plurality of CCA-capable nodes are  
active, and wherein at least 2/3 of the CCA-capable nodes must respond before the  
transmitting instruction block transmits a vote.

**[Claim 35]** (Original) The network of Claim 19, wherein the network is an ad-hoc network.

**[Claim 36]** (Original) The network of Claim 19, wherein at least a portion of the plurality of nodes and CCA-capable nodes are mobile.

**[Claim 37]** (Currently Amended) A non-transitory computer-readable medium having computer-executable instructions for causing a computer to perform operations of:

associating a plurality of nodes with a sub-network, each of said plurality of nodes capable of sending and receiving data;

adding a plurality of cross layer communication agent capable nodes, herein referred to as CCA-capable nodes, to said sub-network, said plurality of CCA-capable nodes capable of receiving data from and sending data to said plurality of nodes; and

determining which one of the plurality of CCA-capable nodes to assign as a gateway CCA, whereby

said gateway CCA is used by each one of said plurality of nodes within said sub-network to communicate with the rest of the network wherein

the act of determining the assignment of the gateway CCA further comprises acts of:

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designating one of the plurality of CCA-capable nodes to be a gateway CCA;

broadcasting a message from each CCA-capable node to the plurality of nodes every  $T_1$  seconds;

wherein  $T_1$  is a predetermined time period; and

selecting a new gateway CCA based upon the message from each CCA-capable node; and wherein

the act of selecting a new gateway CCA further comprises acts of:

determining a current time at which the message from each CCA-capable node was received;

retrieving a gateway time TLAST at which a message from the gateway CCA was received;

wherein TLAST is determined as a time when the message from the gateway CCA was received last;

designating each CCA-capable node as a Responding CCA-capable node when  $TLAST < (\text{current time} - 2(T_1))$  is true for the CCA-capable node; and

selecting and assigning a new gateway CCA from the ~~Responding~~ CCA-capable nodes ~~such that  $TLAST < (\text{current time} - 2(T_1))$  is true, herein referred to as Responding CCA-capable nodes.~~

**[Claim 38]** (Currently Amended) The non-transitory computer-readable medium of Claim 37, wherein the act of determining the assignment of the gateway CCA further comprises sub-acts of:

querying the gateway CCA from each node to determine whether it is active and  
awaiting a response, and

when: the gateway CCA responds, repeating the querying act; otherwise,  
broadcasting a solicit message for receipt by CCA-capable nodes and  
awaiting a response, and

when: a CCA-capable node responds, assigning a CCA-capable node as the  
gateway CCA; otherwise, repeating the broadcasting act.

**[Claim 39]** (Currently Amended) The non-transitory computer-readable medium of Claim 38, wherein when a plurality of CCA capable nodes respond, selecting from the plurality of CCA-capable nodes responding, a single CCA-capable node for use by all of the nodes as the gateway CCA.

**[Claim 40]** (Cancelled)

**[Claim 41]** (Currently Amended) The non-transitory computer-readable medium of Claim 37, wherein said act of determining further comprises acts of:

querying the plurality of Responding CCA-capable nodes, from each node, to  
determine whether they are active and awaiting a response, and



when: the gateway CCA responds, repeating the querying act; otherwise,  
changing the CCA-capable node assigned to be the gateway CCA based  
upon a response from the plurality of Responding CCA-capable nodes.

**[Claim 42]** (Currently Amended) The non-transitory computer-readable medium of Claim 41, wherein when a plurality of CCA capable nodes respond, selecting from the plurality of CCA-capable nodes responding, a single CCA-capable node for use by all of the nodes as the gateway CCA.

**[Claim 43]** (Cancelled)

**[Claim 44]** (Currently Amended) The non-transitory computer-readable medium of Claim 37 wherein said act of determining the assignment of the gateway CCA further comprises acts of:

compiling a list of Responding CCA-capable nodes on at least one CCA-capable  
node of the plurality of Responding CCA-capable nodes;  
querying each CCA-capable node, from the at least one CCA-capable node, in  
the list to determine its state; updating the list of Responding CCA-capable  
nodes based on a response from each of the CCA-capable nodes; and  
checking for a response from the gateway CCA, and

when: the gateway CCA responds, repeating the querying act; otherwise,  
transmitting the list of Responding CCA-capable nodes to the plurality of  
nodes in the sub-network; and  
electing and assigning a new gateway CCA from the list of Responding CCA  
capable nodes.

**[Claim 45]** (Cancelled)

**[Claim 46]** (Currently Amended) The non-transitory computer-readable medium  
of Claim 37, wherein the act of determining further comprises acts of:

querying each CCA-capable node, from at least one CCA-capable node of the  
plurality of Responding CCA-capable nodes, in the plurality of Responding  
CCA-capable nodes to determine its state;  
updating a list of Responding CCA-capable nodes, stored on the at least one  
CCA capable node, based on a response from each of the CCA-capable  
nodes;  
sending, from the at least one CCA-capable node, the list of Responding CCA-  
capable nodes to the plurality of nodes in the sub-network; waiting to  
repeat the querying act; and  
checking, by at least one node in the plurality of nodes, the list of Responding  
CCA capable nodes for the gateway CCA, and

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when: the gateway CCA is in the list of Responding CCA-capable nodes, said at least one node waiting for the next list of CCA-capable nodes; otherwise, selecting and assigning a new gateway CCA from the list of Responding CCA-capable nodes.

**[Claim 47]** (Cancelled)

**[Claim 48]** (Cancelled)

**[Claim 49]** (Cancelled)

**[Claim 50]** (Cancelled)

**[Claim 51]** (Currently Amended) The non-transitory computer-readable medium of Claim 37 wherein said act of determining further comprises acts of:

transmitting a vote from each CCA-capable node to all other CCA-capable nodes  
identifying which Responding CCA-capable node has been designated a subsequent gateway CCA; and  
tallying said votes for each Responding CCA-capable node, and  
when: one Responding CCA-capable node receives more votes than any of the other Responding CCA capable nodes, assigning the one CCA-capable node to become the new gateway CCA, otherwise repeating the transmitting act.

**[Claim 52]** (Currently Amended) The non-transitory computer-readable medium of Claim 51 further comprising an act of determining if at least 2/3 of the plurality of CCA-capable nodes are active, and wherein at least 2/3 of the CCA-capable nodes must respond before performing the act of transmitting the vote.

**[Claim 53]** (Currently Amended) The non-transitory computer-readable medium of Claim 37 wherein the act of associating the plurality of nodes further comprises an act of associating the plurality of nodes in an ad-hoc manner.

**[Claim 54]** (Currently Amended) The non-transitory computer-readable medium of Claim 37 further comprising an act of allowing at least a portion of the plurality of nodes and CCA-capable nodes to be mobile.

**[Claim 55]** (Currently Amended) A method for network communications, the method comprising actions of:

associating a node with a sub-network, the node capable of sending data to and receiving data from a plurality of cross layer communication agent capable nodes, herein referred to as CCA-capable nodes; and  
determining which one of the plurality of CCA-capable nodes to assign as a gateway CCA, whereby  
said gateway CCA is used by the node within said sub-network to communicate with the rest of the network; wherein

the act of determining the assignment of the gateway CCA further comprises acts of:

designating one of the plurality of CCA-capable nodes to be a gateway CCA;

broadcasting a message from each CCA-capable node every T1 seconds to the plurality of nodes;

wherein T1 is a predetermined time period; and

selecting a new gateway CCA based upon the message from each CCA-capable node; and wherein

the act of selecting the new gateway CCA further comprises acts of:

determining a current time at which the message from each CCA-capable node was received;

retrieving a gateway time TLAST at which a message from the gateway CCA was received;

wherein TLAST is determined as a time when the message from the gateway CCA was received last;

designating each CCA-capable node as a Responding CCA-capable node when  $TLAST < (\text{current time} - 2(T1))$  is true for the CCA-capable node; and

selecting and assigning a the new gateway CCA from the ~~Responding~~ CCA-capable nodes ~~such that  $TLAST < (\text{current time} - 2(T1))$  is true,~~ herein referred to as Responding CCA-capable nodes.

**[Claim 56]** (Previously Presented) The method of Claim 55, wherein the node further performs the acts of:

querying the gateway CCA from each node to determine whether it is active and awaiting a response, and

when: the gateway CCA responds, repeating the querying act; otherwise, broadcasting a solicit message for receipt by CCA-capable nodes and awaiting a response, and

when: a CCA-capable node responds, assigning a CCA-capable node as the gateway CCA; otherwise, repeating the broadcasting act.

**[Claim 57]** (Original) The method of Claim 56, wherein when a plurality of CCA-capable nodes respond, selecting from the plurality of CCA-capable nodes responding, a single CCA capable node for use by all of the nodes as the gateway CCA.

**[Claim 58]** (Cancelled)

**[Claim 59]** (Currently Amended) The method of claim 55 wherein said act of determining the assignment of the gateway CCA further comprises acts of:

querying the plurality of Responding CCA-capable nodes to determine whether they are active and awaiting a response, and

when: the gateway CCA responds, repeating the querying act; otherwise,  
changing the CCA-capable node assigned to be the gateway CCA based  
upon a response from the plurality of Responding CCA-capable nodes.

**[Claim 60]** (Original) The method of Claim 59, wherein when a plurality of CCA-capable nodes respond, selecting from the plurality of CCA-capable nodes responding, a single CCA-capable node for use by all of the nodes as the gateway CCA.

**[Claim 61]** (Cancelled)

**[Claim 62]** (Original) The method of claim 55 wherein the act of associating a node further comprises an act of associating the node in an ad-hoc manner.

**[Claim 63]** (Original) The method of claim 55 further comprising an act of providing a node capable of being mobile.

**[Claim 64]** (Currently Amended) A node comprising:

a non-transitory computer readable medium; and

a data processing system executing one or more instruction blocks stored on the

non-transitory computer readable medium, wherein

said instruction blocks comprise[[:]]:

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a transmitting and receiving instruction block for communicating with a sub-network, the sub-network comprising of other nodes and a plurality of cross layer communication agent capable nodes, herein referred to as CCA-capable nodes; and

a determination instruction block for the node to determine which CCA-capable node to assign as a gateway CCA, whereby the gateway CCA is used by the node to communicate with a second sub-network;  
wherein

the determination instruction block ~~executes every T1 seconds and~~ further comprises:

a designation instruction block in each of the CCA-capable nodes for designating one of the plurality of CCA-capable nodes to be a gateway CCA; and

a selection instruction block in each of the CCA-capable nodes for selecting a gateway CCA based upon a received active message from each CCA-capable node;

wherein, the received active message is broadcasted from each CCA-capable node to at least the node every T1 seconds;

wherein T1 is a predetermined time period; and wherein

the selection instruction block comprises:



a current time determination instruction block for determining a current time at which the message from each CCA-capable node was received;

a retrieving instruction block for retrieving a gateway time T<sub>LAST</sub> at which a message from the gateway CCA was received;

wherein T<sub>LAST</sub> is determined as a time when the message from the gateway CCA was received last;

a response-designating instruction block for designating each CCA-capable node as a Responding CCA-capable node when  $T_{LAST} < (\text{current time} - 2(T_1))$  is true for the CCA-capable node; and

a selecting and assigning instruction block for selecting and assigning a new gateway CCA from the ~~Responding CCA-capable nodes such that  $T_{LAST} < (\text{current time} - 2(T_1))$  is true, herein referred to as Responding CCA-capable nodes.~~

**[Claim 65]** (Original) The node of Claim 64, wherein the determination instruction block further comprises:

a designation instruction block for designating one of the plurality of CCA capable nodes as the gateway CCA;

a querying message sent to the gateway CCA to determine whether the gateway CCA is active;

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a timeout period where the node waits for a response from the gateway CCA,

and

when: the gateway CCA responds, a second querying message is sent;

otherwise, a solicit message is sent to the plurality of CCA-capable nodes,

and

when: a CCA-capable node responds, an assignment instruction block assigns

the CCA-capable node as the gateway CCA; otherwise, a second solicit

message is sent.

**[Claim 66]** (Original) The node of Claim 64, wherein when a plurality of CCA-capable nodes respond to the solicit message, the assignment instruction block selects a single CCA-capable node from the plurality of CCA-capable nodes responding to the solicit message, for use by the node as the gateway CCA.

**[Claim 67]** (Cancelled)

**[Claim 68]** (Currently Amended) The node of Claim 64, wherein the determination instruction block further comprises:

a designation message for designating one of the plurality of Responding CCA-capable nodes to be a gateway CCA;

a query message for querying the plurality of CCA-capable nodes to determine whether the plurality of CCA-capable nodes are active;

a timeout period where the node waits for a response from each of the plurality of CCA-capable nodes;

a gateway CCA response message, whereby when ~~[[a]]~~ the gateway CCA response message is received, a second query message is sent and

if no gateway CCA response message is received an assignment instruction block changes the CCA-capable node assigned to be the gateway CCA based upon a response from the plurality of Responding CCA-capable nodes.

**[Claim 69]** (Original) The node of Claim 68, when a plurality of CCA-capable nodes respond to the query message, the assignment instruction block selects a single CCA-capable node from the plurality of CCA-capable nodes responding to the solicit message, for use by the node as the gateway CCA.

**[Claim 70]** (Cancelled)

**[Claim 71]** (Currently Amended) A non-transitory computer-readable medium having computer-executable instructions causing a computer to perform operations of: associating the node with a sub-network, the sub-network comprising of other nodes and a plurality of cross layer communication agent capable nodes, herein referred to as CCA-capable nodes; wherein the node is capable of sending and receiving data to and from ~~[[a]]~~ the plurality of CCA-capable nodes; and

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determining which one of the plurality of CCA-capable nodes to assign as a gateway CCA, whereby

said gateway CCA is used by the node within said sub-network to communicate with the rest of the network; wherein

the act of determining the assignment of the gateway CCA further comprises acts of:

designating one of the plurality of CCA-capable nodes to be a gateway CCA;

broadcasting a message from each CCA-capable node every T1 seconds to the plurality of nodes;

wherein T1 is a predetermined time period; and

selecting a new gateway CCA based upon the message from each CCA-capable node; and wherein

the act of selecting further comprises acts of:

determining a current time at which the message was received;

retrieving a gateway time TLAST at which a message from the gateway CCA was received;

wherein TLAST is determined as a time when the message from the gateway CCA was received last;

designating each CCA-capable node as a Responding CCA-capable node

when  $TLAST < (\text{current time} - 2(T1))$  is true for the CCA-capable node;

and selecting and assigning ~~[[a]]~~ the new gateway CCA from the  
~~[[r]]~~ Responding CCA-capable nodes ~~such that  $TLAST - (current\ time - 2(T - 1))$  is true, herein referred to as Responding CCA-capable~~  
~~nodes.~~

**[Claim 72]** (Currently Amended) The non-transitory computer-readable medium of Claim 71, wherein the act of determining the assignment of the gateway CCA further comprises sub-acts of:

querying the gateway CCA from the node to determine whether the gateway CCA is active and awaiting a response, and  
when: the gateway CCA responds, repeating the querying act; otherwise,  
broadcasting a solicit message for receipt by CCA-capable nodes and awaiting a response, and  
when: a CCA-capable node responds, assigning a CCA-capable node as the gateway CCA; otherwise, repeating the broadcasting act.

**[Claim 73]** (Currently Amended) The non-transitory computer-readable medium of Claim 72, wherein when a plurality of CCA-capable nodes respond, selecting from the plurality of CCA-capable nodes responding, a single CCA-capable node for use by the node as the gateway CCA.

**[Claim 74]** (Cancelled)

**[Claim 75]** (Currently Amended) The non-transitory computer-readable medium of Claim 71, wherein said act of determining the assignment of the gateway CCA further comprises acts of:

querying the plurality of CCA-capable nodes to determine whether the plurality of CCA-capable nodes are active and awaiting a response, and  
when: the gateway CCA responds, repeating the querying act; otherwise,  
changing the CCA-capable node assigned to be the gateway CCA based upon a response from the plurality of CCA-capable nodes.

**[Claim 76]** (Original) The non-transitory computer-readable medium of Claim 75, wherein when a plurality of CCA capable nodes respond, selecting from the plurality of CCA-capable nodes responding, a single CCA-capable node for use by the node as the gateway CCA.

**[Claim 77]** (Cancelled)

**[Claim 78]** (Currently Amended) A method for network communications, the method comprising acts of:

associating a cross layer communication capable node, herein referred to as CCA-capable node<sub>1</sub> with a sub-network,

the sub-network comprising a plurality of CCA-capable nodes, the CCA-capable node capable of sending and receiving data to and from nodes within the sub-network; and

determining the CCA-capable node to assign as a gateway CCA, whereby said gateway CCA is used by the nodes within the sub-network to communicate with the rest of the network; wherein

the act of determining the assignment of the gateway CCA further comprises acts of:

designating one of the plurality of CCA-capable nodes to be a gateway CCA;

broadcasting a message from each CCA-capable node every T1 seconds to the plurality of nodes;

wherein T1 is a predetermined time period; and

selecting a new gateway CCA based upon the message from each CCA-capable node; wherein

the act of selecting further comprises acts of:

determining a current time at which the message from each CCA-capable node was received;

retrieving a gateway time TLAST at which a message from the gateway CCA was received;

wherein TLAST is determined as a time when the message from the gateway CCA was received last;

designating each CCA-capable node as a Responding CCA-capable node  
when  $TLAST < (\text{current time} - 2(T1))$  is true for the CCA-capable  
node; and

selecting and assigning  $[[a]]$  the new gateway CCA from the

$[[r]]$  Responding CCA-capable nodes ~~such that  $TLAST - (\text{current time} - 2(T1))$  is true, herein referred to as Responding CCA-capable~~  
~~nodes.~~

**[Claim 79]** (Currently Amended) The method of Claim 78, wherein said act of  
determining the assignment of the gateway CCA further comprises acts of:

compiling a list of Responding CCA-capable nodes on at least one CCA-capable  
node of the plurality of CCA-capable nodes;

querying each CCA-capable node, from the at least one CCA-capable node, in  
the list to determine the state of each CCA-capable node;

updating the list of Responding CCA-capable nodes based on a response from  
each of the CCA-capable nodes; and

checking for a response from the gateway CCA, and

when: the gateway CCA responds, repeating the querying act; otherwise,

transmitting the list of Responding CCA-capable nodes to the plurality of  
nodes in the sub-network; and



selecting and assigning a new gateway CCA from the list of Responding CCA-capable nodes.

**[Claim 80]** (Cancelled)

**[Claim 81]** (Currently Amended) The method of claim 78, wherein the act of determining the assignment of the gateway CCA further comprises acts of:

querying each CCA-capable node, from at least one CCA-capable node in the plurality of CCA-capable nodes, in the plurality of CCA-capable nodes to determine the state of each CCA-capable node;

updating a list of Responding CCA-capable nodes, stored on the at least one CCA-capable node, based on a response from each of the CCA-capable nodes;

sending, from the at least one CCA-capable node, the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network;

waiting to repeat the querying act; and

checking, by at least one node in the plurality of nodes, the list of Responding CCA capable nodes for the gateway CCA, and

when: the gateway CCA is in the list of Responding CCA-capable nodes, said at least one node waiting for the next list of Responding CCA-capable nodes; otherwise, selecting and assigning a new gateway CCA from the list of Responding CCA-capable nodes.

**[Claim 82]** (Cancelled)

**[Claim 83]** (Cancelled)

**[Claim 84]** (Cancelled)

**[Claim 85]** (Cancelled)

**[Claim 86]** (Currently Amended) The method of Claim 78, wherein said act of determining the assignment of the gateway CCA further comprises acts of:

transmitting a vote from each Responding CCA-capable node to all other CCA-capable nodes identifying which CCA-capable node has been designated a subsequent gateway CCA; and  
tallying said votes for each CCA-capable node, and  
when: one CCA-capable node receives more votes than any of the other CCA-capable nodes, assigning the one CCA-capable node to become the new gateway CCA, otherwise repeating the transmitting act.

**[Claim 87]** (Original) The method of claim 86 further comprising an act of determining if at least 2/3 of the plurality of CCA-capable nodes are active, and wherein at least 2/3 of the CCA capable nodes must respond before performing the act of transmitting the vote.

**[Claim 88]** (Currently Amended) A cross layer communication capable node, herein referred to as CCA-capable node comprising:

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a non-transitory computer readable medium; and

a data processing system executing one or more instruction blocks stored on [[a]]

the non-transitory computer readable medium, wherein said instruction blocks comprise[[:]]:

a first transmitting and receiving instruction block for communicating with a sub-network, the CCA-capable node capable of sending data to and receiving data from nodes and a plurality of CCA-capable nodes within the sub-network; and

a determination instruction block for determining the CCA-capable node to assign as a gateway CCA, whereby

said gateway CCA is so assigned and used by the nodes within the sub-network to communicate with the rest of the network;

a designation instruction block for designating one of the plurality of CCA-capable nodes to be a gateway CCA;

a broadcast message sent from the CCA-capable node every T1 seconds to the plurality of nodes;

wherein T1 is a predetermined time period; and

a selecting instruction block for selecting a gateway CCA based upon a received active message from each CCA-capable node; wherein

the selecting instruction block comprises:

a current time determination instruction block for determining a current time at which [[the]] a received active message from each other CCA-capable node was received; wherein,  
the received active message is broadcasted from each other CCA-capable node to at least the CCA-capable node every T1 seconds;  
a retrieving instruction block for retrieving a gateway time TLAST at which a message from the gateway CCA was received;  
wherein TLAST is determined as a time when the message from the gateway CCA was received last;  
designating each CCA-capable node as a Responding CCA-capable node when  $TLAST < (\text{current time} - 2(T1))$  is true for the CCA-capable node; and  
a selecting and assigning instruction block for selecting and assigning a new gateway CCA from the [[r]]Responding CCA-capable nodes such that  $TLAST - (\text{current time} - 2(T1))$  is true, herein referred to as Responding CCA-capable nodes.

**[Claim 89]** (Previously Presented) The CCA-capable node of Claim 88, wherein the determination instruction block further comprises:

a designation message for designating one of the plurality of Responding CCA-capable nodes to be a gateway CCA;  
a compiling instruction block for compiling a list of CCA-capable nodes;

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a query message sent from the CCA-capable node for querying each CCA capable node in the list to determine its state, whereby the compiling instruction block updates the list of Responding CCA-capable nodes based on a response from each of the CCA capable nodes, and checks for a response from the gateway CCA, and when the gateway CCA responds, a second query message is sent; otherwise, a transmitting instruction block transmits the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network; and a selecting and assigning instruction block in each node selects and assigns a new gateway CCA from the list of Responding CCA-capable nodes.

**[Claim 90]** (Cancelled)

**[Claim 91]** (Previously Presented) The CCA-capable node of Claim 88 further comprising:

a designation instruction block for designating one of the plurality of Responding CCA-capable nodes to be a gateway CCA;

a query message sent from the CCA-capable node for querying each CCA capable node in the plurality of Responding CCA-capable nodes to determine its state;

a compiling instruction block for compiling a list of CCA-capable nodes based on a response from each of the Responding CCA-capable nodes;

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a sending instruction block for sending the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network; and  
a checking instruction block for checking the list of Responding CCA-capable nodes for the gateway CCA, whereby  
when the gateway CCA is in the list of Responding CCA-capable nodes the node waits for the next list of CCA-capable nodes; otherwise, a selecting and assigning instruction block in each node selects and assigns a new gateway CCA from the list of Responding CCA-capable nodes.

**[Claim 92]** (Cancelled)

**[Claim 93]** (Cancelled)

**[Claim 94]** (Cancelled)

**[Claim 95]** (Cancelled)

**[Claim 96]** (Previously Presented) The CCA-capable node of Claim 88 further comprising:

a designation instruction block for designating one of the plurality of Responding CCA-capable nodes to be a gateway CCA;  
a transmitting instruction block for transmitting a vote from the CCA-capable node to all other CCA-capable nodes identifying which Responding CCA-capable node has been designated a subsequent gateway CCA; and

a tallying instruction block in the CCA-capable node for tallying said votes for each Responding CCA-capable node, whereby when one Responding CCA-capable node receives more votes than any of the other CCA-capable nodes, an assigning instruction block for assigning the one Responding CCA-capable node to become the new gateway CCA, otherwise the transmitting instruction block transmits a second vote.

**[Claim 97]** (Currently Amended) The [[network]] CCA-capable node of Claim 96 further comprising

a determination instruction block for determining if at least 2/3 of the plurality of CCA-capable nodes are active, and wherein at least 2/3 of the CCA-capable nodes must respond before the transmitting instruction block transmits a vote.

**[Claim 98]** (Currently Amended) A non-transitory computer-readable medium for enabling a cross layer communication capable node, herein referred to as CCA-capable node, the non-transitory computer readable medium having computer-executable instructions for causing a computer in the CCA-capable node to perform operations of:

associating a CCA-capable node with a sub-network, the CCA-capable node capable of sending and receiving data to and from nodes within the sub-network; and

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determining the CCA-capable node to assign as a gateway CCA, whereby said

gateway CCA is used by the nodes within the sub-network to

communicate with the rest of the network; wherein

the act of determining the assignment of the gateway CCA further comprises acts

of:

designating one of the plurality of CCA-capable nodes to be a gateway

CCA;

broadcasting a message from each CCA-capable node every T1 seconds

to the plurality of nodes;

wherein T1 is a predetermined time period; and

selecting a new gateway CCA based upon the message from each CCA-

capable node; wherein

the act of selecting further comprises acts of:

determining a current time at which the message from each CCA-capable

node was received;

retrieving a gateway time TLAST at which a message from the gateway

CCA was received;

wherein TLAST is determined as a time when the message from the

gateway CCA was received last;

designating each CCA-capable node as a Responding CCA-capable node

when  $TLAST < (\text{current time} - 2(T1))$  is true for the CCA-capable

node; and



selecting and assigning ~~[[a]]~~ the new gateway CCA from the

~~[[r]]~~ Responding CCA-capable nodes ~~such that  $TLAST - (current\ time - 2(T - 1))$  is true, herein referred to as Responding CCA-capable nodes.~~

**[Claim 99]** (Currently Amended) The non-transitory computer-readable medium of Claim 98, wherein said act of determining the assignment of the gateway CCA further comprises acts of:

compiling a list of Responding CCA-capable nodes on at least one CCA-capable node of the plurality of CCA-capable nodes;  
querying each CCA-capable node, from the at least one CCA-capable node, in the list to determine the state of each CCA-capable node;  
updating the list of Responding CCA-capable nodes based on a response from each of the CCA-capable nodes; and  
checking for a response from the gateway CCA, and  
when: the gateway CCA responds, repeating the querying act; otherwise,  
transmitting the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network; and  
selecting and assigning a new gateway CCA from the list of Responding CCA-capable nodes.

**[Claim 100]** (Cancelled)

**[Claim 101]** (Currently Amended) The non-transitory computer-readable medium of claim 98, wherein the act of determining the assignment of the gateway CCA further comprises acts of:

querying each CCA-capable node, from at least one CCA-capable node in the plurality of CCA-capable nodes, in the plurality of CCA-capable nodes to determine the state of each CCA-capable node;

updating a list of Responding CCA-capable nodes, stored on the at least one CCA capable node, based on a response from each of the CCA-capable nodes;

sending, from the at least one CCA-capable node, the list of Responding CCA-capable nodes to the plurality of nodes in the sub-network;

waiting to repeat the querying act; and

checking, by at least one node in the plurality of nodes, the list of Responding CCA capable nodes for the gateway CCA, and

when: the gateway CCA is in the list of Responding CCA-capable nodes, said at least one node waiting for the next list of Responding CCA-capable nodes; otherwise, selecting and assigning a new gateway CCA from the list of Responding CCA-capable nodes.

**[Claim 102]** (Cancelled)

**[Claim 103]** (Cancelled)

**[Claim 104]** (Cancelled)

**[Claim 105]** (Cancelled)

**[Claim 106]** (Currently Amended) The non-transitory computer-readable medium of Claim 98, wherein said act of determining the assignment of the gateway CCA further comprises acts of:

transmitting a vote from each Responding CCA-capable node to all other CCA-capable nodes identifying which CCA-capable node has been designated a subsequent gateway CCA; and  
tallying said votes for each CCA-capable node, and  
when: one CCA-capable node receives more votes than any of the other CCA-capable nodes, assigning the one CCA-capable node to become the new gateway CCA, otherwise repeating the transmitting act.

**[Claim 107]** (Currently Amended) The non-transitory computer-readable medium of claim 106 further comprising an act of determining if at least 2/3 of the plurality of CCA-capable nodes are active, and wherein at least 2/3 of the CCA-capable nodes must respond before performing the act of transmitting the vote.

***Allowable Subject Matter***

Claims 1-3, 5-6, 8, 10, 15-21, 23-24, 26, 28, 33-39, 41-42, 44, 46, 51-57, 59-60, 62-66, 68-69, 71-73, 75-76, 78-79, 81, 86-89, 91, 96-99, 101, 106-107 are allowed.

2. The following is an examiner's statement of reasons for allowance:

Claims 1, 19, 37, 55, 64, 71, 78, 88 and 98 define the distinct features:

broadcasting a message from CCA-capable nodes at a predetermined interval,

T1;

a current time is determined when the broadcasted message from a CCA-capable node is received at a node;

a last time is determined when a message from a gateway CCA-capable node is received at a node;

the time when a broadcasted message is received by a node is determined and compared to the last time, TLAST, a message from a gateway CCA-capable node was received;

when the formula  $TLAST < (\text{current} - 2(T1))$  is true for each CCA-capable node a message is received from, the respective CCA-capable node is designated as a Responding CCA-capable node; and

a new gateway CCA is assigned from the Responding CCA-capable nodes designated as such.

The cited prior art of record teaches or discloses determining a new gateway or leader based on the metrics of a network. More specifically, a ping command evaluates the time taken to reach a node from the gateway and gateway candidates, wherein a new gateway is selected from the fastest ping time by evaluating and ranking each ping

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measurement. However, the cited prior art of record does not teach or suggest the claimed limitations as mentioned above in conjunction with all other limitations of the independent and dependent claims. The claims 1-3, 5-6, 8, 10, 15-21, 23-24, 26, 28, 33-39, 41-42, 44, 46, 51-57, 59-60, 62-66, 68-69, 71-73, 75-76, 78-79, 81, 86-89, 91, 96-99, 101, 106-107 are hereby allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SHERMAN LIN whose telephone number is (571)270-7446. The examiner can normally be reached on Monday through Friday 8:30AM-5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joon Hwang can be reached on 571-272-4036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. L./  
Examiner, Art Unit 2447  
10/23/2010

/Joon H. Hwang/  
Supervisory Patent Examiner, Art Unit 2447